The Case for an Informed Path Selection Service

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Internet is evolving

Past: One Content = One Server

Today: Many servers offer the same content
Path Diversity

- If there exist multiple paths,
- there also exist multiple performances on those paths,
  - bandwidth
  - delay
  - jitter
  - loss
  - ...

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Choosing the Right Path

• In such a context, it might be interesting for applications
  - to choose the path that better suits their requirements
• ISPs would define policies to influence traffic. This is useful for
  - load sharing
  - Primary/Backup links
  - Managing P2P traffic
Delegation

• Making the path selection at the application-level is not always the best choice
  - Limited view of the topology
  - Measurement redundancy
• Instead, it is better to delegate to a third party
  - path ranking
  - measurement
IDIPS - Architecture
IDIPS - Server

IDIPS Server

KB

ISP1 ISP0 ... ISPX

enable: 1

::/0

2000::/16
BW: 1Mbps
RTT: 90ms
Cost: 1

2000:1::/64
2000:2::/48
BW: 1Mbps
RTT: 90ms

4000::/16
enable: 0

KB Updater

Wait for updates and populate the KB
Message Queue

Cost Functions

Compute the cost of any pair

Decision Engine

For each pair, compute cost
Rank possible pairs

Queries Listener

Wait for ranking queries and reply to them

IDIPS Server
IDIPS - Scalability

• How to efficiently measure and store performances?
  - Works with prefixes instead of addresses
  - Measures only high-interest destinations
  - Measurement techniques based on clustering
IDIPS - Scalability (2)

- Purpose:
  - Reduce the number of targets to measure
  - Keep measurements as accurate as possible

- Clustering techniques:
  - $n$-agnostic clustering
  - BGP clustering
  - $n$-hybrid clustering
IDIPS - Scalability (3)

![Graph showing measurements sets proportion across different days of the week (sat, sund, mond, tue, wed, thu, fri). The graph compares IP and BGP data.]
IDIPS Scalability (4)
IDIPS - Scalability (5)
IDIPS - Lightweight
Conclusion

• IDIPS is a
  - generic
  - scalable
  - lightweight
  solution for path ranking
• IDIPS is designed to be easily deployed in ISP/corporate/campus networks
• Our implementation of IDIPS is available
  - http://inl.info.ucl.ac.be